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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,277	09/30/2003	A. Mufit Ferman	SLA1346 (7146.0164)	6561

55648 7590 02/25/2009

KEVIN L. RUSSELL
CHERNOFF, VILHAUER, MCCLUNG & STENZEL LLP
1600 ODSTOWER
601 SW SECOND AVENUE
PORTLAND, OR 97204

EXAMINER	
GE, YUZHEN	
ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
02/25/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/676,277	FERMAN, A. MUFIT	
	Examiner	Art Unit	
	YUZHEN GE	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2009*.

2a)☒ This action is FINAL. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20,22 and 23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *20 and 22* is/are allowed.

6)☒ Claim(s) *1-5,7-15,17-19 and 23* is/are rejected.

7)☒ Claim(s) *6 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Examiner's Remark

Applicant's amendment, filed on 1/31/2009 has been received and entered into the file. The 101 rejections of claims 1-23 have been overcome in view of applicant's amendments and/or remarks and are hereby withdrawn. Claims 1-20 and 22-23 are amended and pending. Claims 20 and 22 have been incorporated with allowable subject matter and is therefore allowable.

Regarding applicant's argument that the amended limitation "applying a threshold mask to ... provide a residual image that contains regions of said multi-channel image uniquely characterized by being potentially affected by a flash, but not uniquely characterized by being a potential facial region", the examiner would like to point out that instant application performs this step on Page 4, last paragraph and Page 5 first paragraph to obtain a flash mask which is later combined with other mask to represent the locations where the red-eye artifacts are most likely to occur. The teaching of Benati et al also discloses steps like this. Benati et al also apply a threshold mask the same way as the instant application (col. 4, lines 17-28) to obtain a bit map/mask. Although Benati et al apply thresholds for luminance, luma and saturation together, it is obvious that the step of applying the thresholds can be separately performed. Therefore the 103 rejections have not been overcome.

Specification

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required. Claims 1-11 recite "applying a threshold mask to ... provide a residual image that contains regions of said multi-channel image uniquely characterized by being potentially affected by a flash, but not uniquely characterized by being a potential facial region".

Claims 12-19 and 23 recite "provide a residual image that contains regions of said multi-channel image uniquely characterized by being potentially affected by a flash, but not uniquely characterized by a potential facial region". There is no antecedent basis for the claimed subject matter.

Claim Objections

2. Claims 1-19 and 23 are objected to because of the following informalities. Claims 1-11 recite "applying a threshold mask to ... provide a residual image that contains regions of said multi-channel image uniquely characterized by being potentially affected by a flash, but not uniquely characterized by being a potential facial region". Claims 12-19 and 23 recite "provide a residual image that contains regions of said multi-channel image uniquely characterized by being potentially affected by a flash, but not uniquely characterized by a potential facial region". There does not seem to be description on the residual image. Also what exactly is a threshold mask? Appropriate correction is required. For examination purposes, the examiner will interpret the claim limitation as described on Page 4 and 5 of the specification.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benati et al (US Patent 5,748,764, cited by IDS).

Regarding claim 12, Benati et al teach a method to identify sub-regions of a multi-channel image containing red-eye (col. 4, lines 21-31), said multi-channel image having at least a first channel and a second channel (Fig. 5, first channel is hue and second channel is saturation, col. 4, lines 231-31), said method comprising:

(a) identifying a sub-region of said image as containing a red-eye region based upon, at least in part, applying a first mask to said first channel, said first mask comparing a first statistic of at least one pixel of said image to a first threshold (col. 4, lines 21-31, the first statistic is the hue value of a pixel, first threshold is either 700 or 1010, Fig. 6a, see also col. 3, lines 50-53, col. 5, lines 17-27, col. 4, lines 18-27, col. 5, lines 43-67, col. 8, lines 40-67) to provide a residual image that contains regions of said multi-channel image uniquely characterized by being potentially affected by a flash, but not uniquely characterized by being a potential facial region (110 in Fig. 2, 210 in Fig. 3, Figs. 9-11, col. 4, lines 21-45, the bit map is used to provide such image in the same way as the instant application); and

(b) applying a second mask to said second channel, said second mask comparing a second statistic of at least one pixel of said image to a second threshold, said second statistic being a different property than said first statistic (col. 4, lines 21-31, the second statistic is the saturation value of a pixel, the second threshold is either 65 or 256, the interpretation of statistic is as explained by the applicant in office action dated 7/7/2008, i.e., it can be pixel value, Fig. 6C),

(c) removing the identified said red eye from said multi-channel image (300 in Fig. 2). However they do not explicitly teach the second mask is applied to the residual image. But the steps of Benati et al on col. 4, lines 20-45 can be performed sequentially and the order does not

matter, that is, first applying the threshold for luminance first, then obtaining a residual image, and then applying the threshold for saturation to the residual image. It is mainly a design choice. It is desirable to be flexible when designing the algorithm. Therefore it would have been obvious to one of the ordinary skill in the art, at the time of invention, to apply the threshold for luminance first and provide a residual image and apply the threshold for saturation to the residual image.

Regarding claim 14, Benati et al teach the method of claim 12 wherein said first threshold is different than said second threshold (col. 4, lines 21-31, the thresholds for hue and saturation are different).

5. Claims 1-5, 7-11, 13, 15, 17 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benati et al (US Patent 5,748,764, cited by IDS) in view of Koga et al (U S Patent 5,848,185).

Regarding claims 1, 7 and 23, Benati et al teach a method to identify sub-regions of a multi-channel image (Figs. 1 and 2) comprising:

converting and providing said multi-channel image to a modified multi-channel image wherein at least one of said channels is an enhanced luminance channel that has more than 60% of the luminance information of said multi-channel image (col. 3, lines 46-62, col. 4, lines 17-28, col. 5, lines 43-57, col. 8, lines 44-63, the lightness channel contains 100% luminance and

therefore contains greater than 60% of the luminance information) and at least one of said channel is a saturation channel (col. 4, lines 17-28); and

identifying a sub-region of said image as containing the red-eye region based upon, at least in part, processing said saturation channel by applying a saturation mask to one or more pixels of said image (col. 4, lines 17-45);

removing the identified said red eye from said multi-channel image (300 in Fig. 2). However they do not explicitly teach the saturation mask is applied to the residual and said saturation mask comparing the standard deviation of the saturation value of a respective pixel to a threshold and they do not explicitly identifying location variations in said saturation based upon the standard deviation of the saturation value of pixels in said channel that substantially includes said saturation.

But the steps of Benati et al on col. 4, lines 20-45 can be performed sequentially and the order does not matter, that is, first applying the threshold for luminance first, then obtaining a residual image, and then applying the threshold for saturation to the residual image. It is mainly a design choice. It is desirable to be flexible when designing the algorithm. Therefore it would have been obvious to one of the ordinary skill in the art, at the time of invention, to apply the threshold for luminance first and provide a residual image and apply the threshold for saturation to the residual image.

In the same field of image segmentation and object detection, Koga et al teach applying a saturation mask to one or more pixels of said image, said saturation mask comparing the

standard deviation of the saturation value of a respective pixel to a threshold (col. 15, lines 34-41, the saturation mask compares the variance of the saturation value of a respective pixel to a threshold which is equivalent to comparing the standard deviation of the saturation value to a threshold because the variance is square of the standard deviation, Fig. 13, the respective pixel is a pixel in the image segment) to determine whether an image segment is monochromatic or color (Fig. 13). Koga et al also teach identifying location variations in said saturation based upon the standard deviation of the saturation value of pixels in said channel that substantially includes said saturation (col. 15, lines 22-41, the variance is the square of standard deviation, and variance of the image segment represents the location variations of standard deviation and variance in the image segment, Fig. 13). It is desirable to be efficient when detecting red-eye region by first focus on color region and detecting color region/segment. The method Koga et al is also a method to try in the method of Benati et al with predictable results (In re KSR v. Teleflex Inc). Therefore it would have been obvious to one of the ordinary skill in the art, at the time of invention, to use the method of Koga et al to detect whether an image segment is color or monochromatic first and then to find skin area and red eye area on the color area so that red-eye detection is more efficient.

Regarding claim 2, Benati et al and Koga et al teach the method of claim 1. Koga et al further teach wherein said standard deviation of said saturation value of a respective pixel is measured relative to the mean saturation of pixels in a neighborhood local to said respective pixel (col. 15, lines 21-34, the neighborhood is the image segment).

Regarding claims 3 and 8, Benati et al and Koga et al teach the method of claim 1 and claim 7. Benati et al further teach wherein said modified multi-channel image has hue, saturation, and intensity channels (col. 4, lines 17-28).

Regarding claims 4 and 9, Benati et al and Koga et al teach the method of claim 3 and 8. Benati et al teach wherein said saturation channel represents the relative bandwidth of the visible output from a light source (col. 4, lines 17-28, the value of Sat by definition is the relative bandwidth of the visible output from a light source).

Regarding claims 5 and 10, Benati et al and Koga et al teach the method of claim 4 and claim 9. Benati et al further teach wherein said hue is substantially the wavelength within the visible-light spectrum at which the energy output from a source is the greatest (col. 4, lines 17-28, inherent from the definition of hue).

Regarding claim 11, Benati et al and Koga et al teach the method of claim 7. Benati et al further teach wherein each channel of said multi-channel image is processed differently to identify said sub-region of said image (col. 4, lines 17-28, the thresholds are different for different channels).

Regarding claim 13, Benati et al teach the method of claim 12 where said first statistic is the intensity value of said pixel in said first channel. However they do not explicitly teach a second statistic is the standard deviation of a pixel in a second channel. In the field of object detection and extraction, Koga et al teach applying a saturation mask to one or more pixels of an image,

said saturation mask comparing the standard deviation of the saturation value of a respective pixel to a threshold (col. 15, lines 34-41, the saturation mask compares the variance of the saturation value of a respective pixel to a threshold which is equivalent to comparing the standard deviation of the saturation value to a threshold because the variance is square of the standard deviation, Fig. 13, the respective pixel is a pixel in the image segment). It is desirable to be efficient when detecting red-eye region by first focus on color region. Therefore it would have been obvious to one of the ordinary skill in the art, at the time of invention, to use the method of Koga et al in the method of Benati et al to detect and extract color image segment for red-eye detection so that more efficient detection and extraction can be achieved.

Regarding claim 15, Benati et al and Koga et al teach the method of claim 13. Koga et al further teach wherein said standard deviation of said saturation value of a respective pixel is measured relative to the mean saturation of pixels in a neighborhood local to said respective pixel (col. 15, lines 21-34, the neighborhood is the image segment).

Regarding claim 17, Benati et al and Koga et al teach the method of claim 13. Koga et al teach wherein said second channel represents saturation (col. 15, lines 34-41).

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Benati et al in view of Liang et al (US Patent 6,678,413 B1).

Regarding claim 18, Benati et al teach the method of claim 17. However they do not teach the method comprising using a convex hull technique to identify contiguous regions. Liang et al teach a method comprising using a convex hull technique to identify contiguous regions when segmenting and identifying an object (col. 17, line 53-col. 18, line 6). It is desirable to represent and characterize an object by known techniques automatically (col. 3, lines 1-23 of Liang et al). Convex hull techniques are known to have the advantage of executing in linear time in a two-dimensional array as is usual in image processing. Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention, to use the convex hull method of Liang et al to represent and identify contiguous regions in the method of Benati et al so that more efficient algorithm for red-eye detection can be developed.

7. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Benati et al in view of Liang et al, further in view of Luo et al (US Patent 7,035,461).

Regarding claim 19, Benati et al and Liang et al teach the method of claim 18. However they do not explicitly teach wherein contiguous regions having a size less than a threshold are removed as potential red-eye regions, said threshold computed dynamically based on the size of the input image. In the same field of endeavor, Luo et al teach resizing the input image (Fig. 12, col. 14, line 55-col. 15, line 11, col. 16, lines 46-59) and comparing the contiguous regions of the resized image with a threshold and removing the regions having a size less than a threshold (col. 16, lines 7-14, Figs. 12-13). Depending on the size of the input image, the size of the red-eye is different also. Scaling the input image dynamically based on the size of the input image and then

comparing the size of the contiguous regions with a threshold is equivalent to comparing the non-scaled contiguous region with a threshold that is dynamically computed based on the size of the input image. It is desirable to be efficient and correct when detecting red-eye pixels by eliminating pixels that are impossible to be red eyes (col. 1, lines 46-51 of Luo et al). Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention, to use the method of Luo et al in the method of Benati and Liang et al so that contiguous pixels are eliminated/removed as non red-eye pixels depending on the size of input image.

Allowable Subject Matter

8. Claims 20 and 22 are allowed. Claims 6 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. A statement of reasons that claims 6 and 16 cannot be rejected over the prior art is presented in the previous office action dated Oct. 23, 2007 and will not be repeated here. A statement of reasons that claims 20 and 22 are allowable is provided in the office action dated 1/12/2009 and will not be repeated here.

Conclusion

9. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YUZHEN GE whose telephone number is (571)272-7636. The examiner can normally be reached on 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on 571-272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C Bella/
Supervisory Patent Examiner, Art Unit 2624

Yuzhen Ge
Examiner
Art Unit 2624